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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/078,718	02/19/2002	Yong Kee Yeo	4795-002	5401

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EXAMINER

THAI, LUAN C

ART UNIT PAPER NUMBER

2827

DATE MAILED: 01/14/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/078,718

Applicant(s)

YEO ET AL.

Examiner

Luan Thai

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-35 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 February 2002 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Oath/Declaration

2. The declaration filed 02/19/02 is acceptable.

Claim Objections

3. Claim 2 is objected to because of the following informalities:

In claim 2, line 2-3, the recitation "said first plurality of solder balls" should be changed to --said first plurality of solder ball pads--.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

5. Claims 1- 3, 5- 9, 11-13, 16-19, 21-26, and 28-32 are rejected under 35 U.S.C. 102(e) as being anticipated by Zhao et al (US-2002/0185734 A1).

The figures and reference numbers referred to in this office action are used merely to indicate an example of a specific teaching and are not to be taken as limiting.

Regarding claims 1- 3, 5- 9, 11-13, 16-19, 21-26, and 28-32, Zhao et al (see specifically figures 2A-2B-2C and 6) disclose a chip scale package assembly 600 comprising: an integrated circuit die 102 having bond wires (602, 616 and 108) for electrically interconnecting with die 102; a carrier 104/112/614 for electrically connecting the die 102 with a primary circuit board via solder balls 106/606 (Paragraph [0004], lines 6+), the carrier comprising: a substrate 104 (e.g., the flex tape 104) having top and bottom sides; a mounting area on a top side of the carrier to receive the die 102; a plurality of signal wire bond fingers (or signal points) 120 on top side of the carrier 104 (see also figures 9A-9B) to receive signal bond wires 108, which connect to respective ones of the signal connections 118 on the die 102. Since Zhao et al further disclose a first set of solder balls 106 (e.g., signal solder balls) attached on the bottom side of the carrier 104 and connected to conductive vias formed through the carrier 104 (paragraph [0099]), a plurality of ball pads would inherently exist on the bottom side of the carrier 104 for the solder balls 106 to be soldered to. Thus, the first set of signal solder balls 106 are electrically connected to the signal connections 118 on the die 102 via: ball pads formed on the bottom side of carrier 104, conductive vias formed through the carrier 104, signal wire bond fingers 120 formed on the top side of the carrier 104, and signal bond wires 108 (paragraphs [0083] and [0099]). Zhao et al also disclose the signal wire bond fingers 120

(e.g., signal points) comprise combined groups of wire bond fingers (e.g., 4 groups as being shown in figure 9B, or 8 groups as being shown in figure 10B) generally distributed around the die mounting area of the top side of the carrier and spaced from an adjacent group (see figures 9B and 10B). Zhao et al further disclose a first ground plane 112 disposed on the top side of the carrier 104, the ground plane 112 having a series of openings 114/206 to expose each group of signal wire bond fingers 120, being a continuous metal plane, completely surrounding each group of signal wire bond fingers 120 and the corresponding signal vias, and covering the die mounting area on the top side of the carrier 104 (see figures 2A-2C-9B-10A-10B). Zhao et al further disclose a second ground plane disposed on the bottom side of the carrier (paragraph [0103]), covering a central area of the bottom side of the carrier (see also figures 11 and 13), electrically and thermally connected to the first ground plane 112 via thermal vias 604, which are operative transfer heat from the die 102 through the substrate. Since Zhao et al disclose a second set of solder balls 606 electrically and thermally coupled to the second ground plane formed on the bottom side of the carrier 104, a plurality areas on second ground plane surface from which the second set of solder balls 606 are respectively attached to are considered as a second plurality of solder bond pads (e.g., ground pads) (see also figure 13). Zhao et al's figure 6 also shows ground wire 602 electrically connected the ground pads 608 (formed on the die 102) to the first ground plane 112.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 4, 10, 14-15, 20, 27, and 33-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhao et al (US-2002/0185734 A1) in view of Tsai (6,380,633).

The figures and reference numbers referred to in this office action are used merely to indicate an example of a specific teaching and are not to be taken as limiting.

Regarding claims 4, 10, 14-15, 20 and 27, Zhao et al disclose all the limitations of the claimed invention as detailed above except for a hatched configuration at a central portion of the first ground plane covering the die mounting area (claims 4, 10, 14-15, and 27) and a contoured border of the first ground plane surrounding the groups of wire bond fingers (claim 20).

Tsai while related to a similar chip scale package assembly design teaches (see specifically figures 4-5) a carrier (e.g., substrate) having a plane 308-310, which comprises a central portion 308 having a hatched configuration, wherein the plane 308-310 has a contoured border surrounding the wire bond fingers, which are located in the area 304, in order to reduce the stress concentration so as to improve the quality and reliability of the carrier (Col. 2, lines 22+). It would have been obvious to one of ordinary skill in the art at the time the invention was made to apply Tsai's teachings to Zhao et al's chip scale

package by forming a hatched configuration at a central portion of the first ground plane 112 with a contoured border surrounding each group of the wire bond fingers 120, in order to reduce the stress concentration so as to improve the quality and reliability of the carrier.

Regarding claims 33-35, Zhao et al disclose all the limitations of the claimed invention as detailed above except for each group of signal points (e.g., wire bond fingers 120) including at least two rows of signal vias disposed in parallel relationship (Zhao et al do disclose each group of signal points 120 (e.g., signal wire bond finger) having one row of respective signal vias, see figures 9B and 10B).

Tsai while related to a similar chip scale package assembly design teaches (see specifically figures 3-4) the package carrier comprising 3 rows of signal points A-B-C (e.g., signal bond pads) disposed in each side of the central ground plane 308, and respectively connected to 3 rows of signal vias a-b-c via conductive traces 306, wherein the signal vias in 3 rows a-b-c are offset with respect to the adjacent row (see figure 4). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Zhao et al's package carrier by adding more row of signal points and signal vias to each group of signal points, in order to increase the number of signal terminals in a package, and such modification is held to be within a general skill of a worker in the art.

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8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luan Thai whose telephone number is (703) 308-1211.

The examiner can normally be reached on 7:00 AM - 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David L. Talbott can be reached on (703) 305-9883. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

A handwritten signature in black ink, appearing to read 'Luan Thai', with a long, sweeping horizontal line extending to the right.

Luan Thai
January 6, 2003